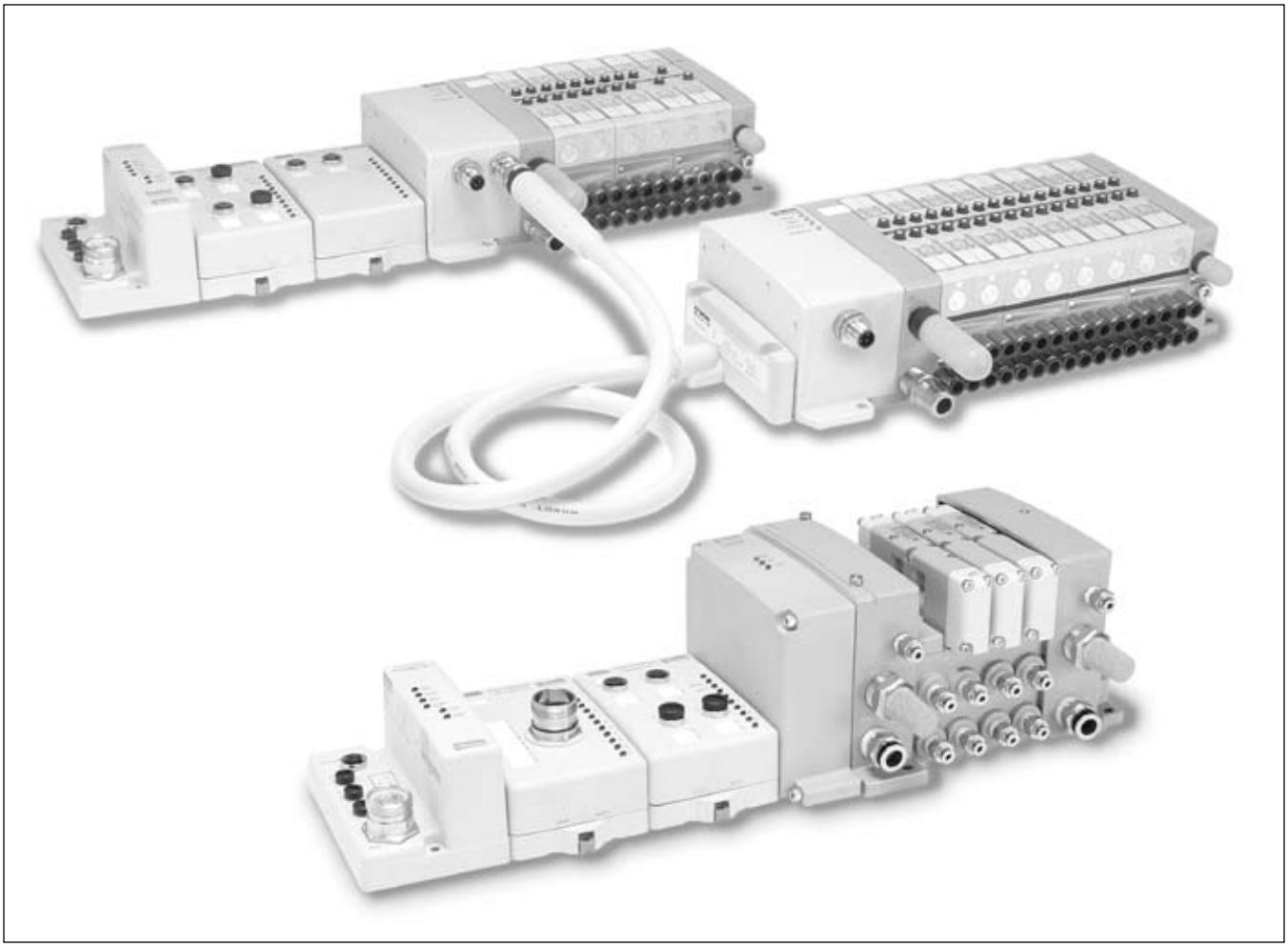
Isysnet Fieldbus System

Section E

www.parker.com/pneu/Isysnet



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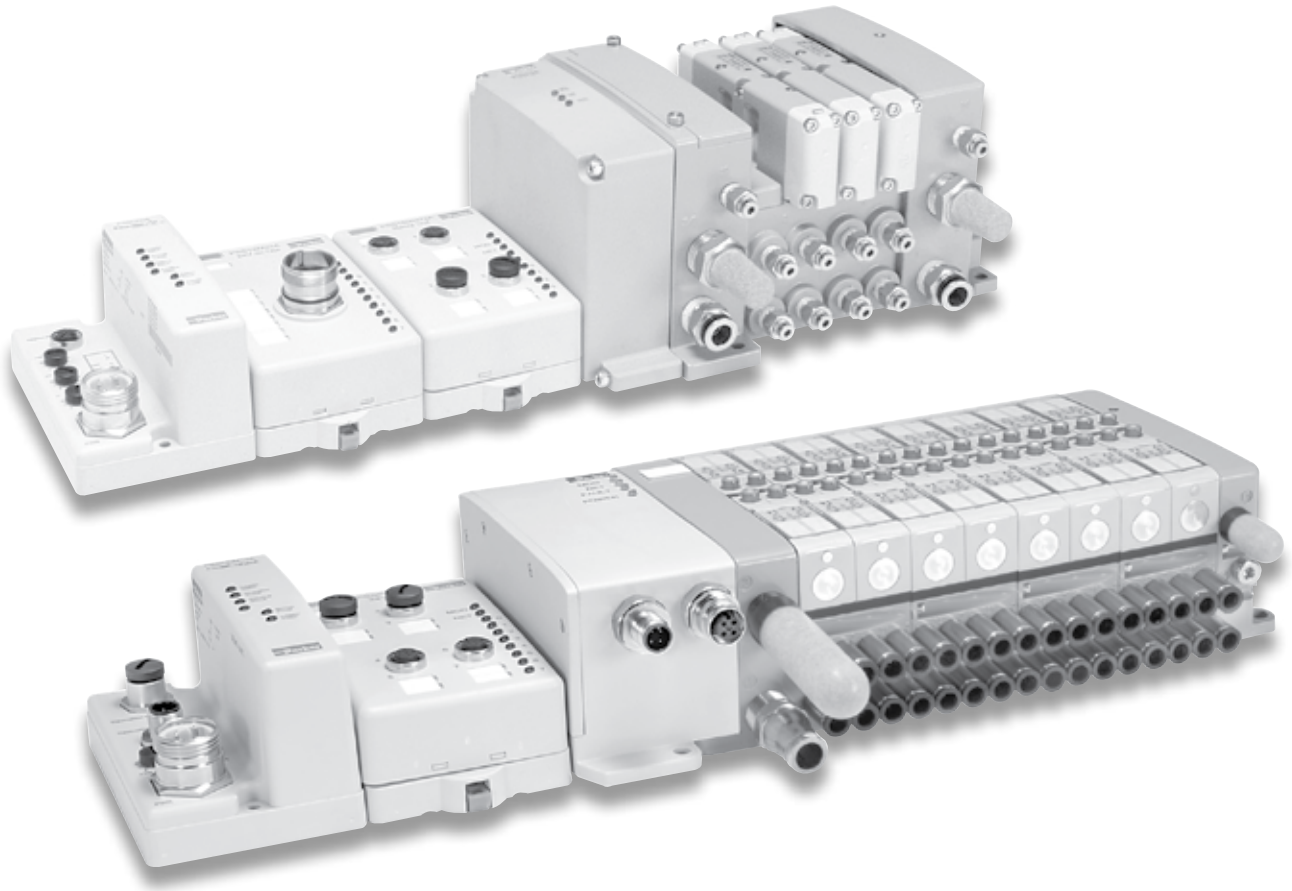
The Isysnet System

Isysnet has four major components:

- **Valve driver module** provide control for 32 solenoids on a manifold, with bus extension providing connectivity to 3 more manifolds
- **I/O modules** provide the field interface, system-interface circuitry, and bases for mounting
- **Communication interface modules** provide the network-interface circuitry
- **Power distribution module** provide the solution to expandability of the Isysnet system

Isysnet Features

- Highly modular design (4pt – 16pt modularity)
- Broad application coverage
- Channel-level diagnostics (LED and electronic)
- Channel-level alarm and annunciation (electronic)
- Channel-level open-wire detection with electronic feedback
- Channel-level short-circuit detection with electronic feedback
- Parameter-level explicit messaging
- Horizontal and vertical mounting without derating
- 5g vibration
- Flash upgradable adapters and digital I/O
- Electronic and mechanical keying
- Robust backplane design
- Quick-disconnects for I/O and network connectivity
- Built-in panel grounding
- Color-coded module labels
- UL, C-UL, and CE certifications (as marked)
- Highly reliable structural integrity
- Optical isolation between field and system circuits



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Communications Module

Protocol	Part Number
Device**Net™**	**PSSCDM18PA** (7/8" Mini) **or PSSCDM12A** (M12)
Control**Net**™	**PSSCCNA**
EtherNet I/P™	**PSSCENA**
Profibus-DP®	**PSSCPBA**

All Modules IP67 Certified
Reference the following Documents for Installation Instructions.
DeviceNet - E101P, PSS-UM001A; Control Net - E103P
Ethernet I/P - E104P; Profibus-DP - E102P
EDS and GSD files located at www.parker.com/pneu/Isysnet

PSSCENA **PSSCCNA**

Devicebus Terminating Resistor

DeviceNet M12 Type A	P8BPA00MA
Profibus-DP M12 Type B	P8BPA00MB

P8BPA00MA

Digital Inputs

I/O Modules	Part Number	Voltage
16 Digital Inputs M12, 5-Pin (NPN Sinking - Requires PNP Sourcing Input Device)	**PSSN16M12A**	10 to 28.8VDC
8 Digital Inputs M12, 5-Pin (NPN Sinking - Requires PNP Sourcing Input Device)	**PSSN8M12A**	10 to 28.8VDC
8 Digital Inputs M12, 5-Pin (PNP Sourcing - Requires NPN Sinking Input Device)	**PSSP8M12A**	10 to 28.8VDC
8 Digital Inputs M8, 3-Pin (NPN Sinking - Requires PNP Sourcing Input Device)	**PSSN8M8A**	10 to 28.8VDC
8 Digital Inputs M8, 3-Pin (PNP Sourcing - Requires NPN Sinking Input Device)	**PSSP8M8A**	10 to 28.8VDC
8 Digital Inputs M23, 12-Pin (PNP Sourcing - Requires NPN Sinking Input Device)	**PSSP8M23A**	10 to 28.8VDC
8 Digital Inputs M23, 12-Pin (NPN Sinking - Requires PNP Sourcing Input Device)	**PSSN8M23A**	10 to 28.8VDC

All Modules IP67 Certified
Reference E106P Documents for Installation Instructions.
See www.parker.com/pneu/Isysnet

PSSN16M12A

PSSN8M8A

PSSP8M23A

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Digital Outputs

I/O Modules	Part Number	Voltage
+ 16 Digital Outputs M23, 19-Pin (PNP Sourcing)	**PSST16M23A**	10 to 28.8VDC
+ 16 Digital Outputs D-Sub, 25-Pin, (PNP Sourcing)	**PSST16D25A**	10 to 28.8VDC
+ 16 Digital Outputs M12, 5-Pin (PNP Sourcing)	**PSST16M12A**	10 to 28.8VDC
+ 8 Digital Outputs M12, 5-Pin (PNP Sourcing)	**PSST8M12A**	10 to 28.8VDC
+ 8 Digital Outputs M8, 3-Pin (PNP Sourcing)	**PSST8M8A**	10 to 28.8VDC
§ 4 Digital Output, High Watt Relay M12, 5-Pin (PNP Sourcing) (2 Amp)	**PSSTR4M12A**	24VDC
+ 8 Digital Outputs M23, 12-Pin (PNP Sourcing)	**PSST8M23A**	10 to 28.8VDC

All Modules IP67 Certified
Reference the following Documents for Installation Instructions.
+ E107P
§ E109P
See www.parker.com/pneu/Isysnet

PSST16D25A

PSST16M12A

PSST8M12A

Analog Inputs

I/O Modules	Part Number	Voltage
‡ 2 Analog Inputs Voltage M12, 5-Pin	**PSSNAVM12A**	0 to 10V ± 10V
‡ 2 Analog Inputs Current M12, 5-Pin	**PSSNACM12A**	4 to 20mA or 0 to 20mA

All Modules IP67 Certified
Reference the following Documents for Installation Instructions.
‡ E110P
See www.parker.com/pneu/Isysnet

PSSNACM12A

Analog Outputs

I/O Modules	Part Number	Voltage
** 2 Analog Outputs Voltage M12, 5-Pin	**PSSTAVM12A**	0 to 10V ± 10V
** 2 Analog Outputs Current M12, 5-Pin	**PSSTACM12A**	4 to 20mA or 0 to 20mA

All Modules IP67 Certified
Reference the following Documents for Installation Instructions.
**E111P
See www.parker.com/pneu/Isysnet

PSSTACM12A

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Terminating Base Module

Extender Module	Part Number
Termination Base for Stand Alone Units	**PSSTERM**

Used as the last Terminating Module for a Stand Alone Isysnet Assembly.

PSSTERM

Power Extender Module

Extender Module	Part Number
24VDC Field Power Module	**PSSSE24A**

A Power Extender Module must be used on every 14th Module in an Isysnet assembly. See www.parker.com/pneu/Isysnet

Reference Document E105P and PSS-SG001 for configuration instructions. See www.parker.com/pneu/Isysnet

PSSSE24A

Bus Extender Cable

1 Meter Cable*	PSSEXT1	24VDC
3 Meter Cable*	PSSEXT3	24VDC

* Requires a PSSSE24 Power Extender Module

IP67 Certified

Reference the following Documents for Installation Instructions.
E117P

See www.parker.com/pneu/Isysnet

PSSEXT1

Isys Micro Bus Extender Cable

1 Meter Cable*	PSSVEXT1	24VDC

IP67 Certified

PSSVEXT1

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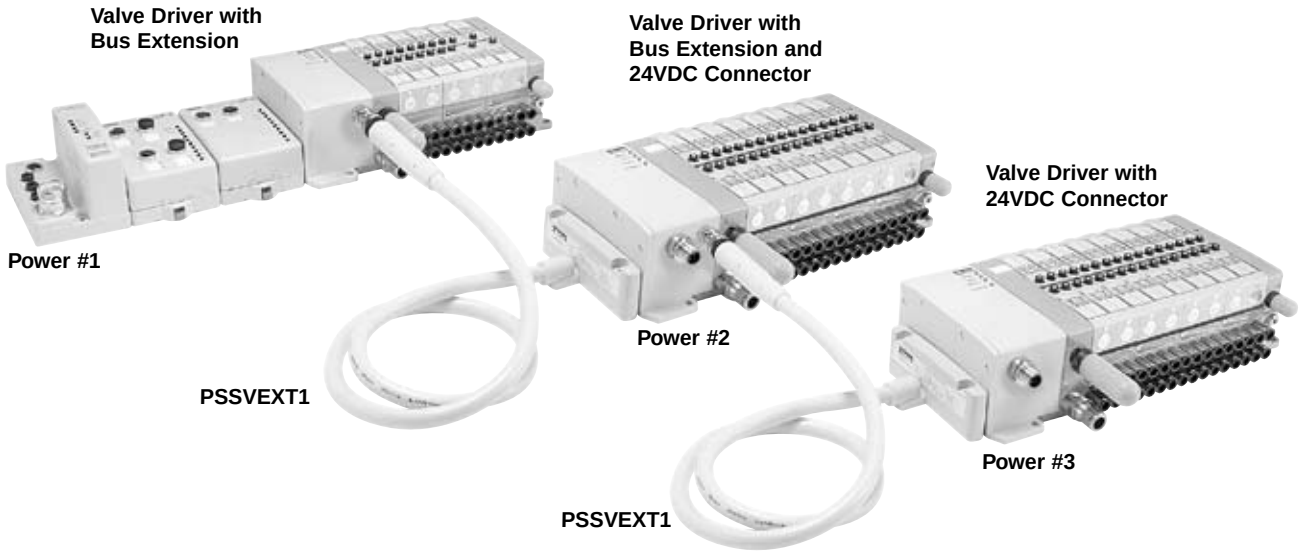
Using Bus Extender Cables

Example #1:
Isys Micro with Standard Bus Extender Cable

- Separate the communication module and a portion of the I/O from other I/O and the valve manifold.
- Commonly used when overall length is restricted.
- PSSSE24A is needed on the extension. No 24VDC connector needed on the Isysnet end plate.

Example #2:
Isys Micro with Bus Extension on Valve Driver Module – No additional I/O at the Extension

- Add up to three additional valve manifolds without adding another communication module.
- No PSSSE24A is needed on the Extension when the Valve Driver Module with 24VDC Connector is used.
- Commonly used when many valves are required.



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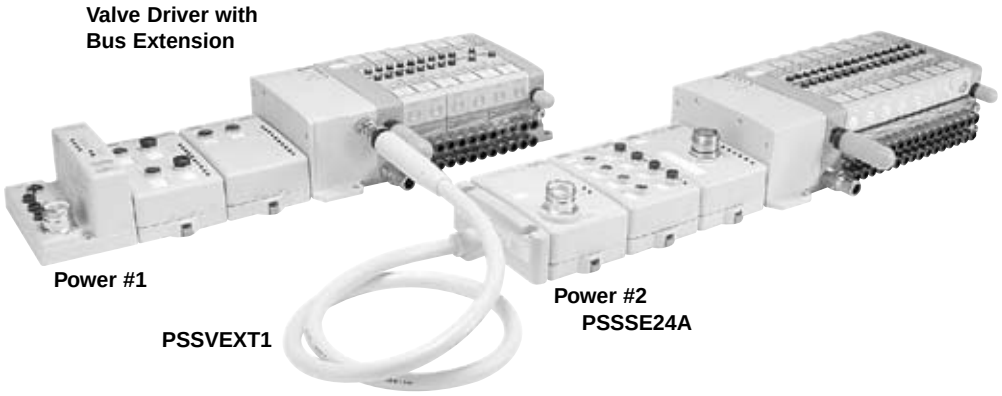
Using Bus Extender Cables

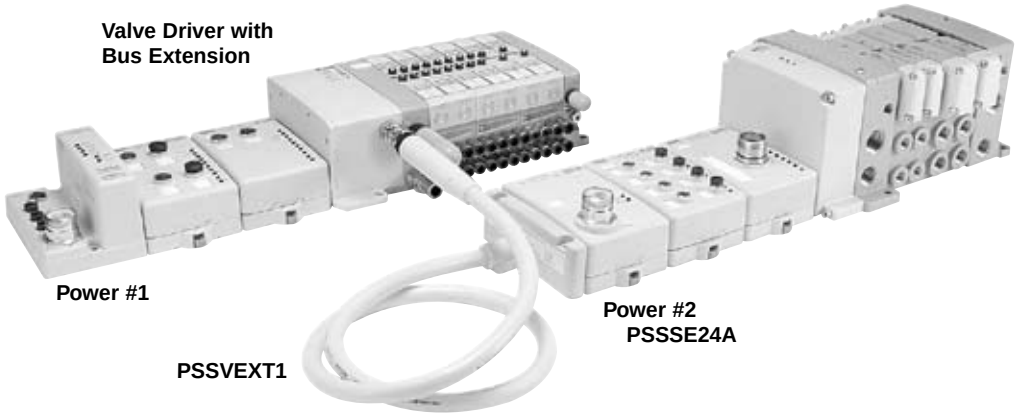
Example #3:
Isys Micro with Bus Extension on Valve Driver – With I/O at Extension

- Add up to three additional valve manifolds without adding another communication module.
- PSSSE24A is needed on the Extension. No 24VDC Connector needed on the Isysnet end plate.
- Commonly used when many valves are required, and each location requires additional I/O.



Example #4:
Isys Micro with Bus Extension on Valve Driver Module – With I/O at the Extension and larger Isys ISO Valve Manifold

- Add up to two additional Isys Micro valve manifolds and one Isys ISO valve manifold without adding another communication module.
- PSSSE24A is needed on the Extension.
- Isys ISO valve manifold must be the last manifold on the Extension
- Commonly used when many valves are required, and each location requires additional I/O.



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Specifying an Isysnet System

Follow these steps as you specify your Isysnet system:

Step		
1	**Select a Communication Interface Module** Choose the interface module for your operating system.	Selecting a Network Selecting the DeviceNet Communication Interface
2	**Select I/O Devices Based on Field Devices** Location of the device Number of Isysnet modules needed Number of I/O available per module Number of modules	 Digital I/O Modules Analog I/O Modules Valve Driver Module
3	**Select Optional Power Component** Choose optional component to extend backplane power	Expansion Power Unit Typical Configurations
4	**Select Accessories**	Cables and Cordsets
5	**Placing Isysnet Modules** Determine necessary dimensions based on the communication interface chosen.	Placing Isysnet Modules Mounting the Isysnet System

Step 1

Select a Communication Module

Selecting Isysnet Communication Interfaces

Rockwell Automation NetLinx Architecture

Separate communication interface adapters are available for different networks. Install adapters into the PointBus backplane to allow Isysnet modules to communicate with a controller.

NetLinx open network architecture is the Rockwell Automation strategy of using open networking technology for seamless, top-floor to shop-floor integration. The networks in the NetLinx architecture, DeviceNet, ControlNet, and EtherNet/IP, speak a common language and share a universal set of communication services. NetLinx architecture, part of the Integrated Architecture, seamlessly integrates all the components in an automation system from a few devices on one network to multiple devices on multiple networks including access to the Internet, helping you to improve flexibility, reduce installation costs, and increase productivity.

Communication Considerations

Isysnet features are impacted by your network choice.

Network	Impact
DeviceNet PSSCDM12A and PSSCDM18PA	DeviceNet offers high-speed access to plant-floor data from a broad range of plant-floor devices and a significant reduction in wiring. The PSSCDM12A and PSSCDM18PA provide two means of connecting a node of I/O to DeviceNet. A total of 63 Isysnet modules can be assembled on a single DeviceNet node.
ControlNet™ PSSCCNA	ControlNet allows intelligent, high-speed control devices to share the information required for supervisory control, work-cell coordination, operator interface, remote device configuration, programming, and troubleshooting. A total of 63 Isysnet modules can be assembled on a single ControlNet node. Up to 25 direct connections and 5 rack connections are allowed.
EtherNet/IP™ PSSCENA	EtherNet/IP is an open industrial networking standard that supports implicit and explicit messaging and uses commercial, off-the-shelf EtherNet equipment and physical media. A total of 63 Isysnet modules can be assembled on a single EtherNet/IP node. Refer to the User Manual, publication PSS-UM004 to determine the ratings for direct and rack connections allowed.
PROFIBUS DP™ PSSCPBA	A total of 63 Isysnet modules can be assembled on a single PROFIBUS node.

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Selecting a Network

You can configure your system for information exchange between a range of devices and computing platforms and operating systems.

Application Requirements	Network	Select
• Plant management (material handling) • Configuration, data collection, and control on a single, high-speed network • Time-critical applications with no established schedule • Data sent regularly • Internet/Intranet connection	EtherNet/IP	PSSCENA
• High-speed transfer of time-critical data between controllers and I/O devices • Deterministic and repeatable data delivery • Media redundancy • Controller redundancy • Intrinsic safety • Redundant controller systems	ControlNet	PSSCCNA
• Connections of low-level devices directly to plant-floor controllers, without interfacing them • Data sent as needed • More diagnostics for improved data collection and fault detection • Less wiring and reduced start-up time than a traditional, hard-wired system	DeviceNet	PSSCDM12A PSSCDM18PA
• Connecting to an existing PROFIBUS DP 5m bus,12 MB network	PROFIBUS	PSSCPBA

Selecting the DeviceNet Communication Interface

Isysnet offers two interfaces for connecting to DeviceNet. Refer to the following table.

For These Features	Remember	Select
Behaves as a slave device on the Main Network and a master on the PointBus. Allows a group of I/O modules on the Subnet to act as a single node on the Main Network. RSNetWorx™ for DeviceNet software is needed for configuration of the PSSCDM12A or PSSCDM18PA on the Main Network and the PointBus Configuration on the PointBus consists of a scan list that is very similar to those used in all of the DeviceNet master scanner modules.	All Isysnet modules count as a single node on the Main Network. The Main Network distance is acceptable. Isysnet expansion power supplies are permitted to add more Isysnet modules.	PSSCDM12A (M12-style network connectors). PSSCDM18PA (mini-style network connectors with pass-through).

It is important that the total amount of data coming from the Subnet does not exceed the data capability of either the PSSCDM12A or PSSCDM18PA.

- 250 bytes (248 data + 2 bytes command info) for output data (used as either COS, cyclic, or poll)
- 250 bytes (248 data + 2 bytes status info) for polled input data
- 250 bytes (248 data + 2 bytes status info) for COS/ cyclic input data
- 8 bytes (6 data + 2 status info) for strobe input data

The data coming through the PSS adapter combined with the other data from the Main Network cannot exceed the data capability of the Main Network master scanner. If this occurs, you will need multiple master scanners on the Main Network and the I/O modules on the Subnet will need to be split between multiple PSSCDM12A or PSSCDM18PA adapters.

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Step 2

Select I/O Modules

Selecting Isysnet Modules

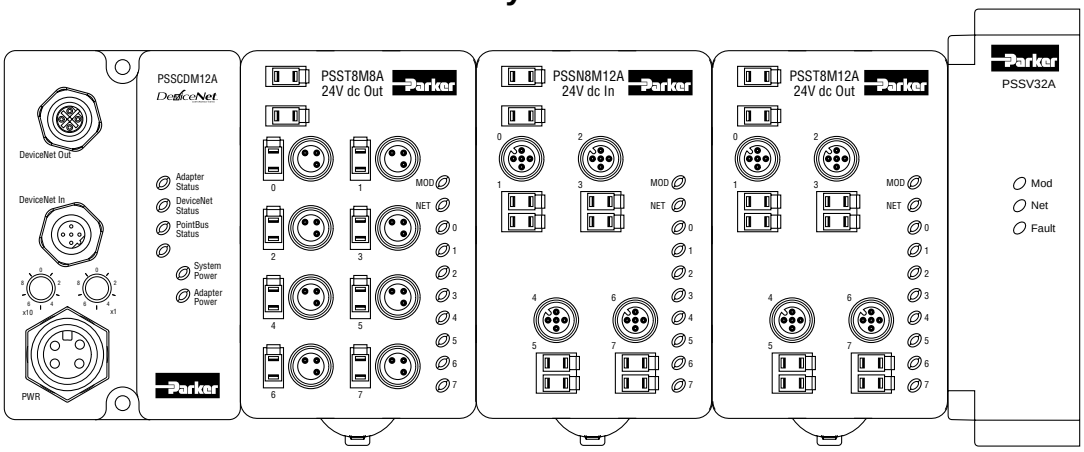
Some modules have diagnostic features, electronic fusing, or individually isolated inputs/outputs.

The Isysnet family provides a wide range of input and output modules to span many applications, from high-speed discrete to process control. Isysnet supports producer/consumer technology, which allows input information and output status to be shared among multiple Logix controllers.

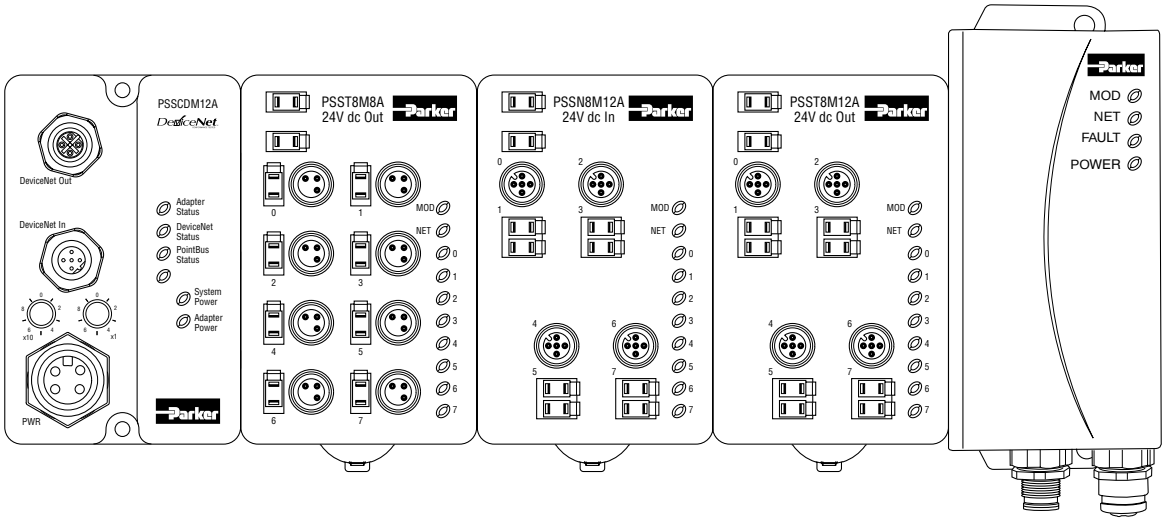
The Isysnet family of I/O modules includes:

- Digital I/O Modules
- Analog I/O Modules
- Valve Driver Module

Isys ISO



Isys Micro



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Digital I/O Modules

Choose digital I/O modules when you need:

- **Input Modules.** An input module responds to an input signal in the following manner:
  - Input filtering limits the effect of voltage transients caused by contact bounce and/or electrical noise. If not filtered, voltage transients could produce false data. All input modules use input filtering.
  - Optical isolation shields logic circuits from possible damage due to electrical transients.
  - Logic circuits process the signal.
  - An input LED turns on or off indicating the status of the corresponding input device.
- **Output Modules.** An output module controls the output signal in the following manner:
  - Logic circuits determine the output status.
  - An output LED indicates the status of the output signal.
  - Optical isolation separates module logic and bus circuits from field power.
  - The output driver turns the corresponding output on or off.
- **Surge Suppression.** Most output modules have built-in surge suppression to reduce the effects of high-voltage transients. However, we recommend that you use an additional suppression device if an output is being used to control inductive devices, such as:
  - Relays
  - Motor starters
  - Solenoids
  - Motors

  Additional suppression is especially important if your inductive device is in series with, or parallel to, hard contacts such as:
  - Push buttons
  - Selector switches

The digital I/O modules support:

- A wide variety of voltage interface capabilities
- Isolated and non-isolated module types
- Point-level output fault states
- Choice of direct-connect or rack-optimized communications
- Field-side diagnostics on select modules

Connector types are indicated by the catalog number. For example, the PSSN8M12A has an M12 connector.

Digital DC Input Modules

	PSSN8M8A PSSN8M12A PSSN8M23A	**PSSN16M12A**	**PSSP8M8A PSSP8M12A PSSP8M23A**
Number of Inputs	8 Sinking	16 Sinking	8 Sourcing
Keyswitch Position	1		1
Voltage, On-State Input, Nom.	24VDC		24VDC
Voltage, On-State Input, Min.	10VDC		10VDC
Voltage, On-State Input, Max.	28.8VDC		28.8VDC
Input Delay Time, ON to OFF	0.5 ms hardware + (0…65 ms selectable)*		0.5 ms hardware + (0…65 ms selectable)*
Current, On-State Input, Min.	2 mA		2 mA
Current, On-State Input, Max.	5 mA		5 mA
Current, Off-State Input, Max.	1.5 mA		1.5 mA
PointBus Current (mA)	75		75
Power Dissipation, Max.	1.0 W @ 28.8VDC		1.0 W @ 28.8VDC

* Input ON-to-OFF delay time is the time from a valid input signal to recognition by the module.

Digital DC Output Modules

	PSST8M8A PSST8M12A PSST8M23A	**PSST16M223A PSST16D25A PSST16M12A**
Number of Outputs	8 sourcing	16 Sourcing
Keyswitch Position	1	
Voltage, On-State Output, Nom.	24VDC	
Voltage, On-State Output, Min.	10VDC	
Voltage, On-State Output, Max.	28.8VDC	
Output Current Rating, Max.	3.0 A per module, 1.0 A per channel	
PointBus Current (mA)	75	
Power Dissipation, Max.	1.2 W @ 28.8VDC	

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Relay Output Module

	PSSTR4M12A
Number of Outputs	4 Form A (N.O.) relays, isolated
Keyswitch Position	7
Output Delay Time, ON to OFF, Max.	26 ms*
Contact Resistance, Initial	30 mΩ
Current Leakage, Off-State Output, Max.	1.2 mA and bleed resistor thru snubber circuit @ 240V ac
Output Current Rating, Max	8.0 A per module, 2.0 A per channel
PointBus Current (mA)	90
Power Dissipation, Max.	0.5 W

*Time from valid output off signal to relay deenergization by module.

Analog I/O Modules

The Isysnet analog modules support: on-board, channel-level data alarming (four set-points per channel); scaling to engineering units; channel-level diagnostics (electronic bits and LEDs); and integer format.

Choose analog I/O modules when you need:

- **Individually configurable channels** to use the module(s) with a variety of sensors.
- **On-board scaling** to eliminate the need to scale the data in the controller. Controller processing time and power are preserved for more important tasks, such as I/O control, communications, or other user-driven functions.
- **On-line configuration.** Modules can be configured in the RUN mode using the programming software or the control program. This allows you to change configuration while the system is operating. For example, the input filter for a particular channel could be changed, or a channel could be disabled based on a batch condition. To use this feature, the controller and network interface must also support this feature.
- **Over- and under-range detections and indications.** This eliminates the need to test values in the control program, saving valuable processing power of the controller. In addition, since alarms are handled by the module, the response is faster and only a single bit per channel is monitored to determine if an error condition has occurred.
- **Ability to direct output device operation during an abnormal condition.** Each channel of the output module can be individually configured to hold its last value or assume a user-defined value on a fault condition. This feature allows you to set the condition of your analog devices, and therefore your control process, which may help to ensure a reliable shutdown.
- **Ability to individually enable and disable channels.** Disabling unused channels improves module performance.
- **Selectable input filters** This lets you select the filter frequencies for each channel that best meets the performance needs of your application based on environmental limitations. Lower filter settings provide greater noise rejection and resolution. Higher filter settings provide faster performance. Note: The analog modules provide four input filter selections.
- **Selectable response to broken input sensor.** This feature provides feedback to the controller that a field device is not connected or operating properly. This lets you specify corrective action based on the bit or channel condition.
- **High accuracy.** The modules share a high accuracy rating of ±0.1% of full-scale accuracy at 25 °C.

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Analog Input Modules

	PSSNACM12A	PSSNAVM12A
Number of Inputs	2	2
Keyswitch Position	3	3
Input Signal Range	4…20 mA 0…20 mA	0…10V ±10V
Input Resolution, Bits	16 bits - over 21 mA 0.32 µA/cnt	15 bits plus sign 320 µV/cnt inunipolar or bipolar mode
Absolute Accuracy, Current Input	0.1% Full Scale @ 25°C*†	—
Absolute Accuracy, Voltage Input	—	0.1% Full Scale @ 25°C*†
Input Step Response, per Channel	70 ms @ Notch = 60 Hz (default) 80 ms @ Notch = 50 Hz 16 ms @ Notch = 250 Hz 8 ms @ Notch = 500 Hz	70 ms @ Notch = 60 Hz (default) 80 ms @ Notch = 50 Hz 16 ms @ Notch = 250 Hz 8 ms @ Notch = 500 Hz
Input Conversion Type	Delta Sigma	Delta Sigma
PointBus Current (mA)	75	75
Power Dissipation, Max.	0.6 W @ 28.8VDC	0.6 W @ 28.8VDC

* Includes offet, gain, non-linearity and repeatability error terms.

† Analog input modules support these configurable parameters and diagnostics: open-wire with LED and electronic reporting; four-alarm and annunciation set-points; calibration mode and electronic reporting; under- and over-range and electronic reporting; channel signal range and update rate and on-board scaling; filter-type; channel update rate.

Analog Output Modules

	PSSTACM12A	PSSTAVM12A
Number of Outputs	2	2
Keyswitch Position	4	4
Output Signal Range	4…20 mA 0…20 mA	0…10V ±10V
Output Resolution, Bits	13 bits - over 21 mA 2.5 µA/cnt	14 bits (13 plus sign) 1.28 mV/cnt inunipolar or bipolar mode
Absolute Accuracy, Current Output	0.1% Full Scale @ 25°C*†	—
Absolute Accuracy, Voltage Output	—	0.1% Full Scale @ 25°C*†
Step Response to 63% of FS,	24 µs	— Current Output
Step Response to 63% of FS,	—	20 µs Voltage Output
Output Conversion Rate	16 µs	20 µs
PointBus Current (mA)	75	75
Power Dissipation, Max.	1.0 W @ 28.8VDC	1.0 W @ 28.8VDC

* Includes offet, gain, non-linearity and repeatability error terms.

† Analog output modules support these configurable parameters and diagnostics: open-wire with LED and electronic reporting (PSSTACM12A only); fault mode; idle mode; alarms; channel signal range and on-board scaling.

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Valve Driver Modules

The PSSV32A and PSSVM32A valve driver modules provide an interface between the Isysnet serial bus system and the valve assembly. This module will always be the last module on the Isysnet serial bus. It controls 32 digital outputs at 24VDC. Depending on the valve selection, it can control up to 32 single solenoid valves or 16 double solenoid valves.

PSV32A is used with Isys ISO valves and PSSVM32A is used with Isys Micro valves.

Valve Driver Module Specifications

	PSSV32A and PSSVM32A
Outputs per Module	32, sourcing
Voltage Drop, On-State Output, Maximum	0.2VDC
Voltage, Off-State Output, Maximum	28.8VDC
Voltage, On-State Output, Maximum Minimum Nominal	 28.8VDC 10VDC 24VDC
Output Current Rating	200 mA per channel, not to exceed 6.0 A per module
Output Surge Current, Maximum	0.5 A for 10 ms, repeatable every 3 seconds
Current Leakage, Off-State Output, Maximum	0.1 mA
Current, On-State Output Minimum	200 mA per channel
Output Delay Time OFF to ON, Maximum[1]	0.1 ms
Output Delay Time, ON to OFF, Maximum[1]	0.1 ms
External DC Power Supply Voltage Range	10 to 28.8VDC
External DC Power Supply Voltage Nominal	24VDC

1. OFF to ON or ON to OFF delay is time from a valid output “on” or “off” signal to output energization or de-energization.

Step 3

Select the Appropriate Power Unit

Selecting a Power Supply Unit

Isysnet adapters have built-in PointBus power supplies. All Isysnet modules are powered from the PointBus by either an adapter or expansion power supply.

Power Specifications

Part Number	Power Supply Input Voltage, Nom.	Operating Voltage Range	Field Side Power Requirements, Max.	Power Supply Inrush Current, Max.	Input Overvoltage Protection	Power Supply Interruption Protection
PSSCDM12A	24VDC	10...28.8VDC	24VDC (+20% = 28.8VDC) @ 400 mA	6 A for 10 ms	Reverse polarity protected	Output voltage will stay within specifications when input drops out for max. load.
PSSCDM18PA						
PSSCCNA						
PSSCENA						
PSSCPBA						
PSSSE24A						

Power units are divided into two categories:

- Communication adapters with built-in power supply (dc-dc)
- Expansion power supply

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Expansion Power Unit

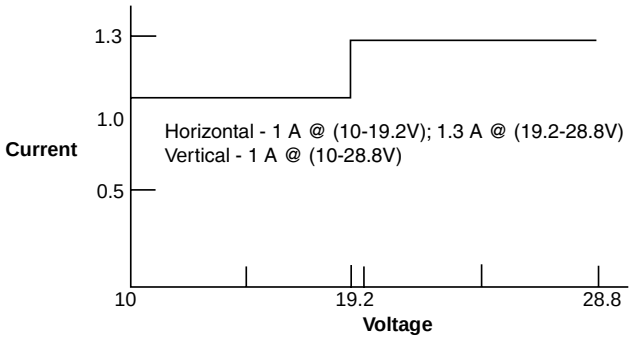
The PSSSE24A expansion power unit passes 24VDC field power to the I/O modules to the right of it. This unit extends the backplane bus power and creates a new field voltage partition segment for driving field devices for up to 13 I/O modules. The expansion power unit separates field power from I/O modules to the left of the unit, effectively providing functional and logical partitioning for:

- Separating field power between input and output modules
- Separating field power to the analog and digital modules
- Grouping modules to perform a specific task or function

You can use multiple expansion power units with any of the communication adapters to assemble a full system. If you are using the PSSCDM12A adapter, you may use a PSSSE24A expansion power unit to add additional modules. For example, if you had a 36 module system with a PSSCDM12A adapter, you would have at least two or more PSSSE24A expansion power units to provide more PointBus current for modules to the right of the supply.

- 24VDC to 5VDC converter
- 1.3A, 5VDC output (extend backplane power)
- Starts new voltage distribution
- Partitioning

PSSSE24A Current Derating for Mounting



Power Distribution General Specifications

	PSSSE24A
Power Supply Requirements	Note: In order to comply with CE Low Voltage Directives (LVD), you must use a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter
Field Side Power Requirements	24VDC (+20% = 28.8VDC max.) @ 400 mA
Inrush Current, Max.	6 A for 10 ms
Input Overvoltage Protection	Reverse polarity protected
Power Supply Interruption Protection	Output voltage will stay within specifications when input drops out for 10 ms at 10V with max. load
Power Supply Input Voltage, Nom.	24VDC
Operating Voltage Range	10…28.8VDC
Power Consumption, Max.	9.8 W @ 28.8VDC
Power Dissipation, Max.	3.0 W @ 28.8VDC
Thermal Dissipation, Max.	10.0 BTU/hr @ 28.8VDC
Isolation Voltage	1250V rms
Field Power Bus Supply Voltage, Nom.	12VDC or 24VDC
Field Power Bus Supply Current, Max.	10 A

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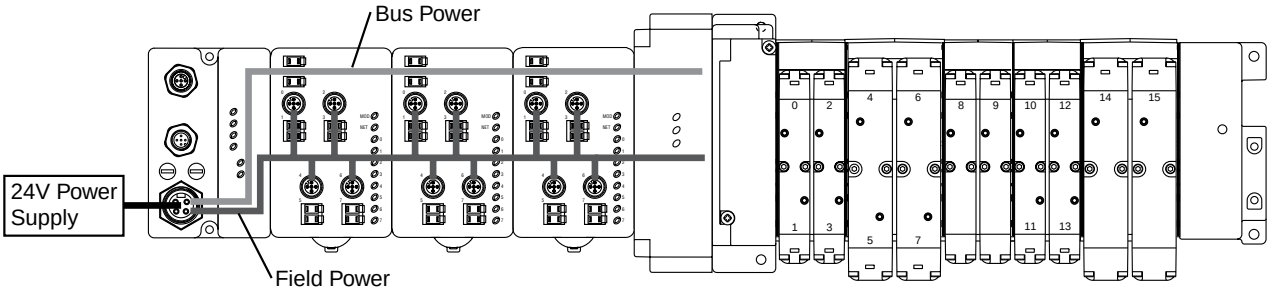
Power Distribution Options for Isys ISO

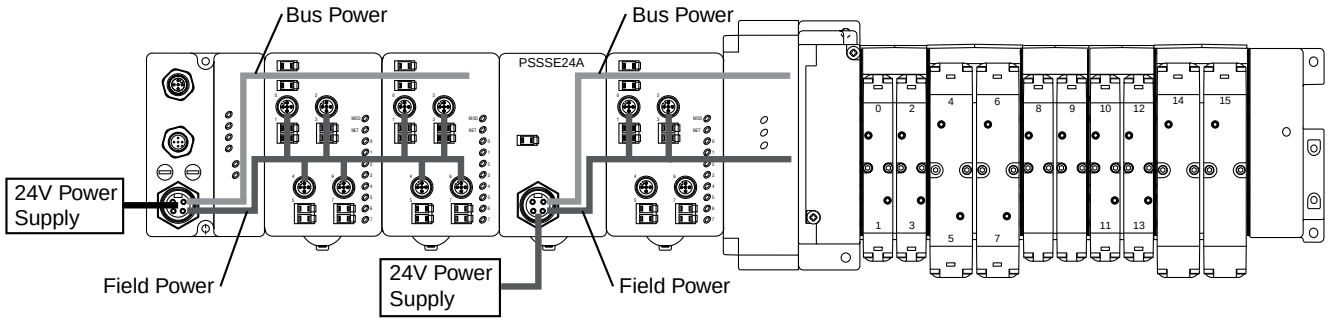
Isysnet Communication Adapter and I/O Modules

An auxiliary 24VDC power supply from the communication module provides power to the PointBus backplane and I/O modules. You can connect up to 13 I/O modules with a maximum of 10 A field power, using the auxiliary power.



Isysnet System with 24VDC Expansion Power Unit (PSSSE24A)

The auxiliary power from the communication module supports up to 13 I/O modules with a maximum of 10 A field power. The 24VDC expansion power unit (PSSSE24A) extends the backplane bus power to support up to 13 more I/O modules. Connect additional expansion power units to expand the I/O assembly up to the maximum of 63 I/O modules.



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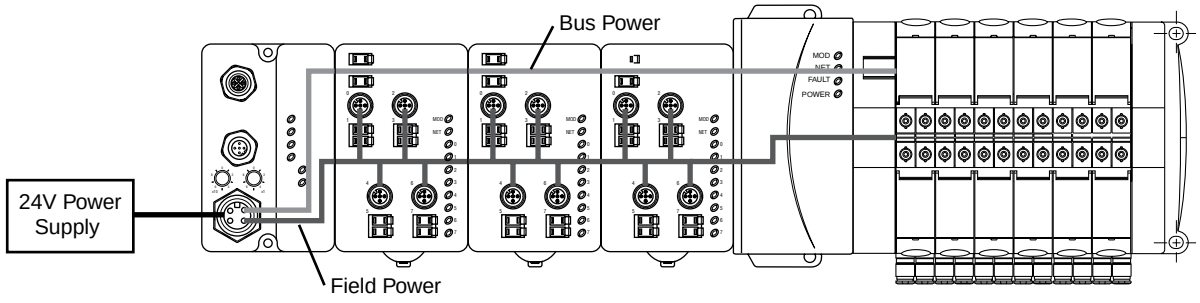
Power Distribution Options for Isys Micro

Isysnet Communication Adapter and I/O Modules

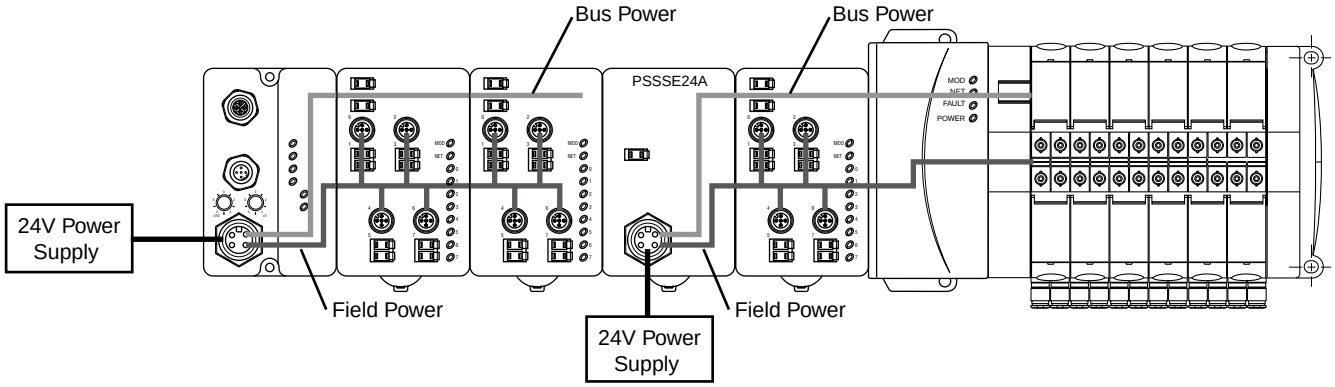
The 24VDC power supply from the Communication Adaptor provides Bus Power and Field Power to the Input, Output and Valve Driver Modules. You can connect up to 13 modules and an adapter with a maximum of 10 A field power, using this power source.



Isysnet Communication Adapter and I/O Modules

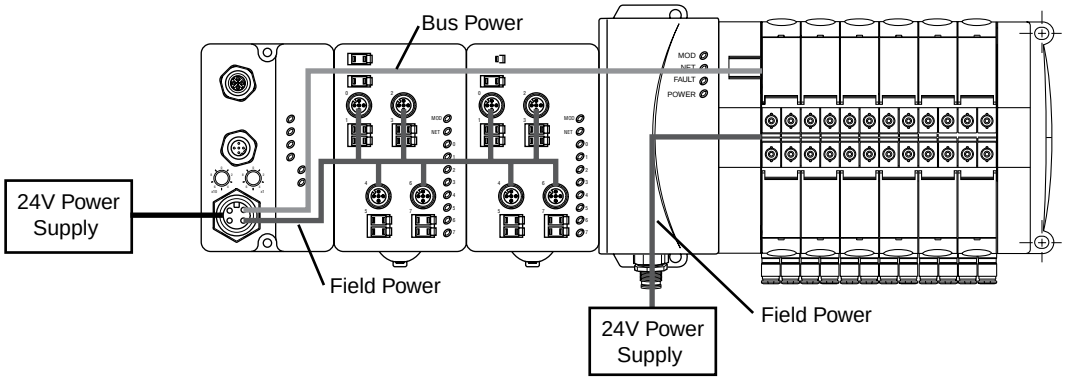
The 24VDC power supply from the Communication Adaptor provides Bus Power and Field Power to the Input and Output Modules. You can connect up to 13 modules and an adapter with a maximum of 10 A field power, using this power source.

The 24VDC expansion power unit (PSSSE24A) extends the Bus Power and Field Power to support up to 13 more Input and Output Modules. Connect additional expansion power units to expand the assembly up to the maximum of 63 I/O modules. The Valve Driver Module is the last module on the system, and will draw Bus Power and Field Power from the PSSSE24A to the left of it.



Isysnet Communication Adapter with 24VDC Connector and I/O Modules

The 24VDC power supply from the Communication Adaptor provides Bus Power and Field Power for up to 13 modules and an adapter with a maximum of 10 A Field Power. In this configuration, Bus Power and Field Power are supplied to the Input and Output Modules. The Communication Adaptor only supplies Bus Power to the Valve Driver Module, as the Isys Micro with 24VDC Connector separates the Field Power from the rest of the network. This secondary 24VDC Connector on the Valve Driver Module supplies Field Power to the valves, and can be wired into an Emergency Stop Circuit.



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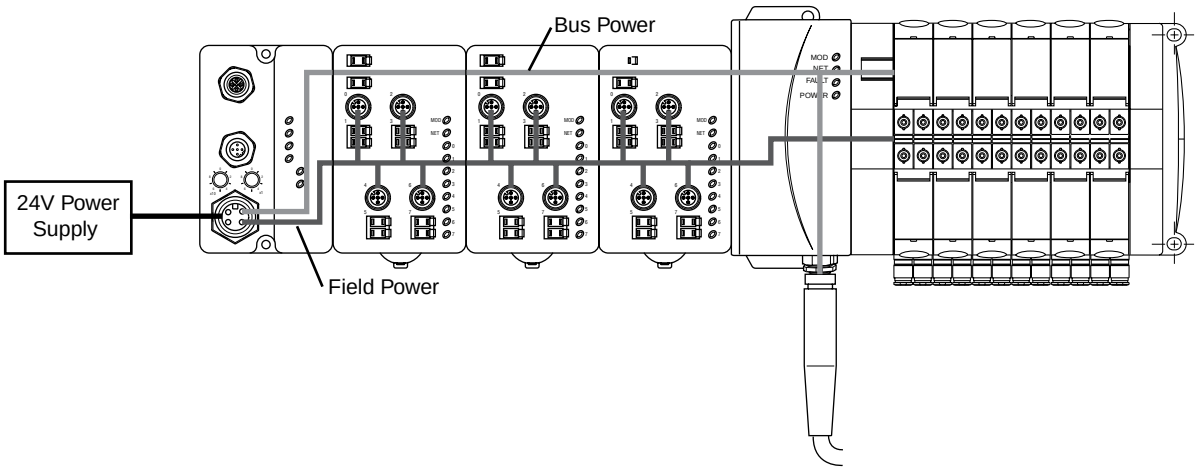
Power Distribution Options for Isys Micro (Continued)

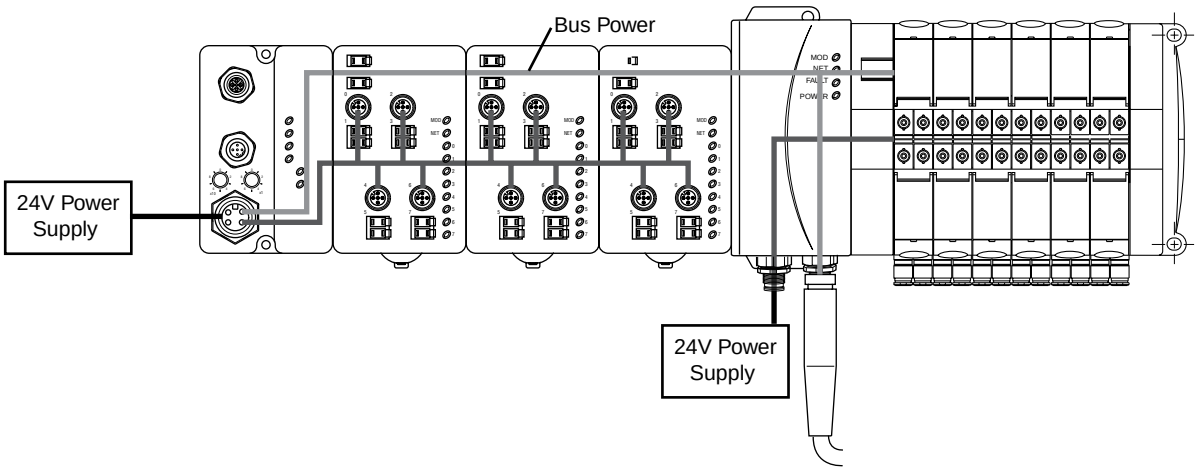
Isysnet Communication Adapter with Bus Extension Connector and I/O Modules

The 24VDC power supply from the Communication Adaptor provides Bus Power and Field Power to the Input, Output and Valve Driver Modules. You can connect up to 13 modules and an adapter with a maximum of 10 A field power, using this power source. The Isys Micro with Bus Extension Connector carries Bus Power and communication down to another Isysnet Assembly through the PSSVEXT1 cable. If additional Isysnet Input and Output Modules or Isys ISO valve manifold is used on this extension, a PSSSE24A Power Extender Module is required to provide Field Power. If the extension is attached directly to an Isys Micro Manifold, Field Power can be supplied directly by using the 24VDC Connector option.



Isysnet Communication Adapter with 24VDC and Bus Extension Connectors and I/O Modules

The 24VDC power supply from the Communication Adaptor provides Bus Power and Field Power for up to 13 modules and an adapter with a maximum of 10 A Field Power. In this configuration, Bus Power and Field Power are supplied to the Input and Output Modules. The Communication Adaptor only supplies Bus Power to the Valve Driver Module, as the 24VDC Connector separates the Field Power from the rest of the network. This secondary 24VDC Connector on the Valve Driver Module supplies Field Power to the valves, and can be wired into an Emergency Stop Circuit. The Bus Extension Connector carries Bus Power and communication down to another Isysnet Assembly through the PSSVEXT1 cable. If additional Isysnet Input and Output Modules or Isys ISO valve manifold is used on this extension, a PSSSE24A Power Extender Module is required to provide Field Power. If the extension is attached directly to an Isys Micro Manifold with 24VDC Connector, Field Power can be supplied directly by using the 24VDC Connector option.



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Step 4

Select Cables and Cordsets

Selecting Accessories

Isysnet Digital Input Module Cables

Part Number	For Using:	Recommended Rockwell Automation Patchcord (double-ended)	Recommended Rockwell Automation Male Cordset (single-ended)
PSSN8M12A	2 inputs per connector	879D-F4ACDM-x	879-C3AEDM4-5
PSSP8M12A	1 input per connector	889D-F4ACDM-x	889D-M4AC-y
PSSN8M8A	3-Pin pico connectors	889P-F3ABPM-x	889P-M3AB-y
PSSP8M8A	4-Pin pico connectors	889P-F4ABPM3-x	
PSSN8M23A	M23, 12-Pin	889M-F12AHMU-z (Inline Connector) 889M-R12AHMU-2 (Right Angle Connector)	—
PSSP8M23A			
PSST8M23A			

x = length in meters (1, 2, 3, 5, and 10 standard)
y = length in meters (2, 5, and 10 standard)
z = length in meters (1, 2, and 3 standard)

For more cables and cordsets, please refer to www.connector.com

Isysnet Analog Inputs and Outputs

Part Number	For Using:	Recommended Cable
PSSNAVM12A	1 input per connector	804506D04M030 Shielded single ended M12 cable, straight connector, 3 meters
PSSNACM12A		
PSSTAVM12A	1 output per connector	
PSSTACM12A		

Isysnet Digital Output Module Cables

Part Number	For Using:	Recommended Rockwell Automation Patchcord (double-ended)	Recommended Rockwell Automation Male Cordset (single-ended)
PSST8M12A	2 inputs per connector	879D-F4ACDM-x	879-C3AEDM4-5
	1 input per connector	889D-F4ACDM-x	889D-M4AC-y
PSST8M8A	3-Pin pico connectors	889P-F3ABPM-x	889P-M3AB-y
	4-Pin pico connectors	889P-F4ABPM3-x	

x = length in meters (1, 2, 3, 5, and 10 standard)
y = length in meters (2, 5, and 10 standard)

Isysnet Relay Output Module Cables

Part Number	Recommended Rockwell Automation Patchcord (double-ended)	Recommended Rockwell Automation Male Cordset (single-ended)
PSSTR4M12A	889D-F4ACDM-x	889D-M4AC-y

x = length in meters (1, 2, 3, 5, and 10 standard)
y = length in meters (2, 5, and 10 standard)

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Isysnet DeviceNet and Auxiliary Power Cables

Part Number	Network	Recommended Rockwell Automation Network Cable	Recommended Rockwell Automation Auxiliary Power Cables
PSSCDM12A PSSCDM18PA	DeviceNet	KwikLink Flat Media system standard drop cable: 1485K-PzF5-R5 (M12) Thin Round system standard drop cable: 1485R-PzN5-M5 (Mini) Thick Round system standard drop cable: 1485C-PzN5-M5 (Mini)	Standard Cordset (single-ended): 889N-F4AFC-yF Standard Patchcord (double-ended): 889N-F4AFNC-y
PSSCCNA	ControlNet	BNC to TNC Connector is required when using BNC Cordsets. See **www.amphenolrf.com** 	
PSSCENA	EtherNet/IP	—	
PSSCPBA	PROFIBUS DP	—	Standard Cordset (single- ended): 889N-F5AFC-y

x = length in meters (1, 2, 3, and 6 standard)
y = length in feet (6, 12, and 20 standard)
z = length in feet (1, 2, 3, 4, 5, and 6 standard)

For more cables and cordsets, please refer to **www.connector.com**

Isysnet Valve Driver Module Harness Assemblies

Valve	Part Number	
	1 to 24 Outputs	25 to 32 Outputs
Isys HA and HB Valve	PS5624P	PS5632P
Isys H1, H2, and H3 Valve	PS4024P	PS4032P

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Step 5

Placing Isysnet Modules

Determining Mounting Requirements

The producer/consumer model multicasts messages. This means that multiple nodes can consume the same data at the same time from a single device. Where you place I/O modules in the control system determines how the modules exchange data.

For a Rockwell controller to control Isysnet, the I/O must be:

- On the same network as the controller **or**
- On a ControlNet network that is local to that controller **or**
- On an EtherNet/IP network that is local to that controller

Maximum Size Layout

Part Number	PointBus Current (mA)	Maximum I/O Modules with 24VDC Backplane Current at 75 mA each	Maximum I/O Modules with Expansion Power Supplies	Maximum Number of I/O Module Connections
PSSCDM12A on DeviceNet	1000	Up to 13	63	
PSSCDM18PA on DeviceNet				
PSSCCNA on ControlNet				5 rack and 20 direct
PSSCENA on EtherNet/IP				20 total connections including rack and direct
PSSCPBA on PROFIBUS				
PSSSE24A Expansion Power	Horizontal mounting: 1A@5Vdc for 10...19.2V input; 1.3A @ 5VDC for 19.2...28.8V input Vertical mounting: 1A @ 5VDC for 10...28.8V input			Not to exceed scanner capacity

Power Supply Distance Rating

Modules are placed to the right of the power supply. Each Isysnet module can be placed in any of the slots to the right of the power supply until the usable backplane current of that supply has been exhausted. An adapter provides 1 A current to the PointBus. The PSSSE24A provides up to 1.3 A and I/O modules require from 75 mA (typical for the digital and analog I/O modules) up to 90 mA or more.

PointBus Current Requirements

Part Number	PointBus Current Requirements
PSSN8xxx	75 mA
PSSP8xxx	
PSST8xxx	
PSSN16xxx	
PSST16xxx	
PSSTR4MRA	90 mA
PSSNACM12A	75 mA
PSSTACM12A	
PSSNAVM12A	
PSSTAVM12A	
PSSV32A	
PSSVM32A	

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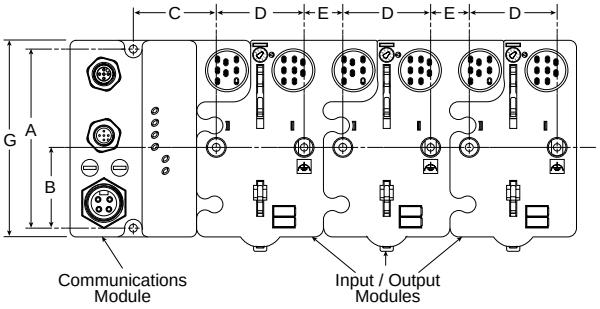
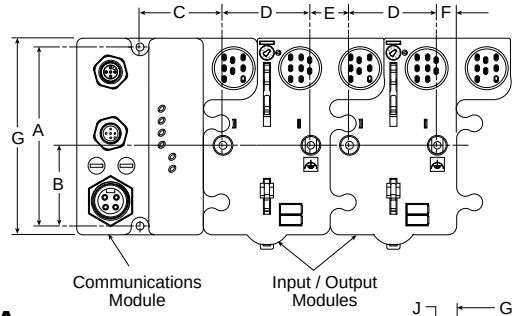
Isysnet with Isys ISO Valves





Dimensions

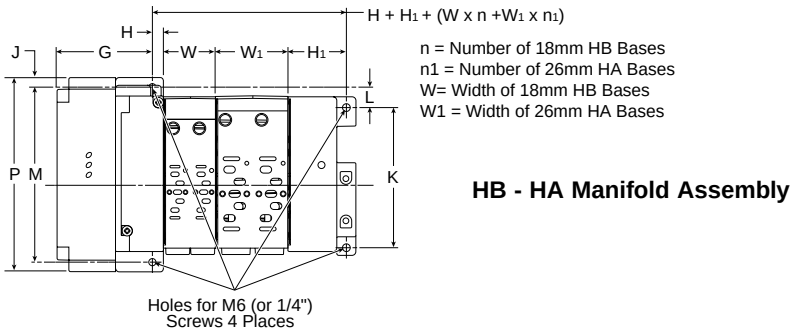
A	B	C	D
4.00 (102)	1.80 (46)	1.90 (48)	2.00 (50)
E	**F**	**G**	
.87 (22)	.43 (11)	4.41 (112)	

Inches (mm)

HB - HA Dimensions

G	H	H_1	J	K
2.68 (68)	.33 (8.4)	1.80 (45.8)	.15 (4)	4.32 (110)
L	**M**	**P**	**W**	**W_1**
.63 (16)	5.39 (137)	5.98 (152)	1.61 (40.8)	2.24 (56.8)

Inches (mm)



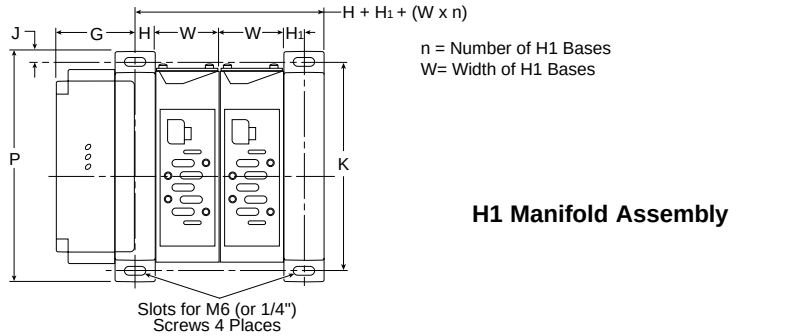
n = Number of 18mm HB Bases
n1 = Number of 26mm HA Bases
W= Width of 18mm HB Bases
W1 = Width of 26mm HA Bases

HB - HA Manifold Assembly

H1 Dimensions

G	H	H_1	J	K
2.20 (56)	.63 (15.9)	.63 (15.9)	.33 (8.5)	6.50 (165)
P	**W**			
7.17 (182)	1.93 (49)			

Inches (mm)



n = Number of H1 Bases
W= Width of H1 Bases

H1 Manifold Assembly

H2 Dimensions

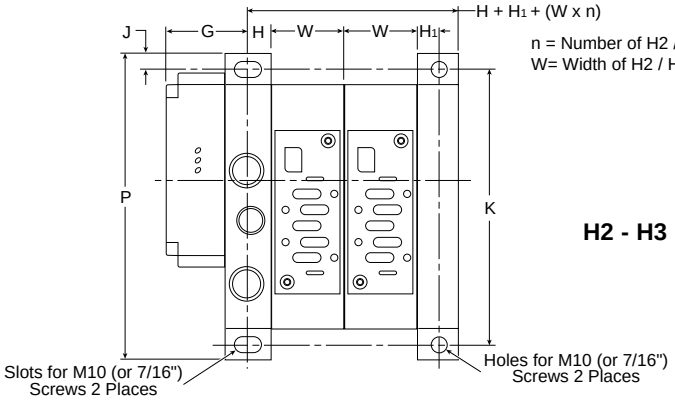
G	H	H_1	J	K
2.28 (58)	.71 (18)	.59 (15)	.47 (12)	8.46 (215)
P	**W**			
9.41 (239)	2.20 (56)			

Inches (mm)

H3 Dimensions

G	H	H_1	J	K
2.52 (64)	.94 (24)	.65 (16.5)	.59 (15)	10.43 (265)
P	**W**			
11.61 (295)	2.80 (71)			

Inches (mm)



n = Number of H2 / H3 Bases
W= Width of H2 / H3 Bases

H2 - H3 Manifold Assembly

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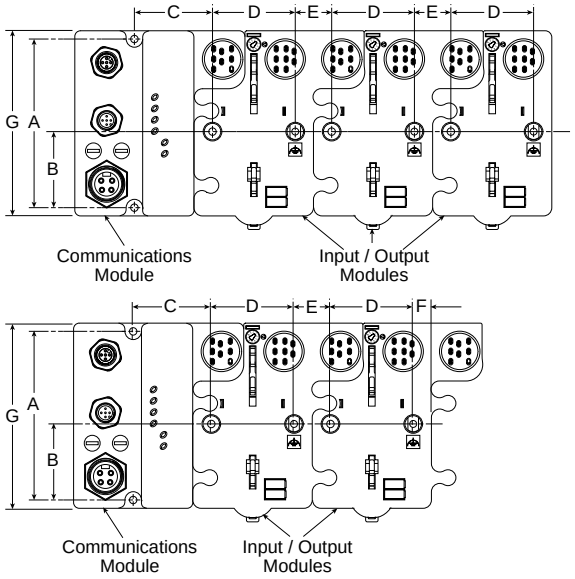
Isysnet with Isys Micro Valves

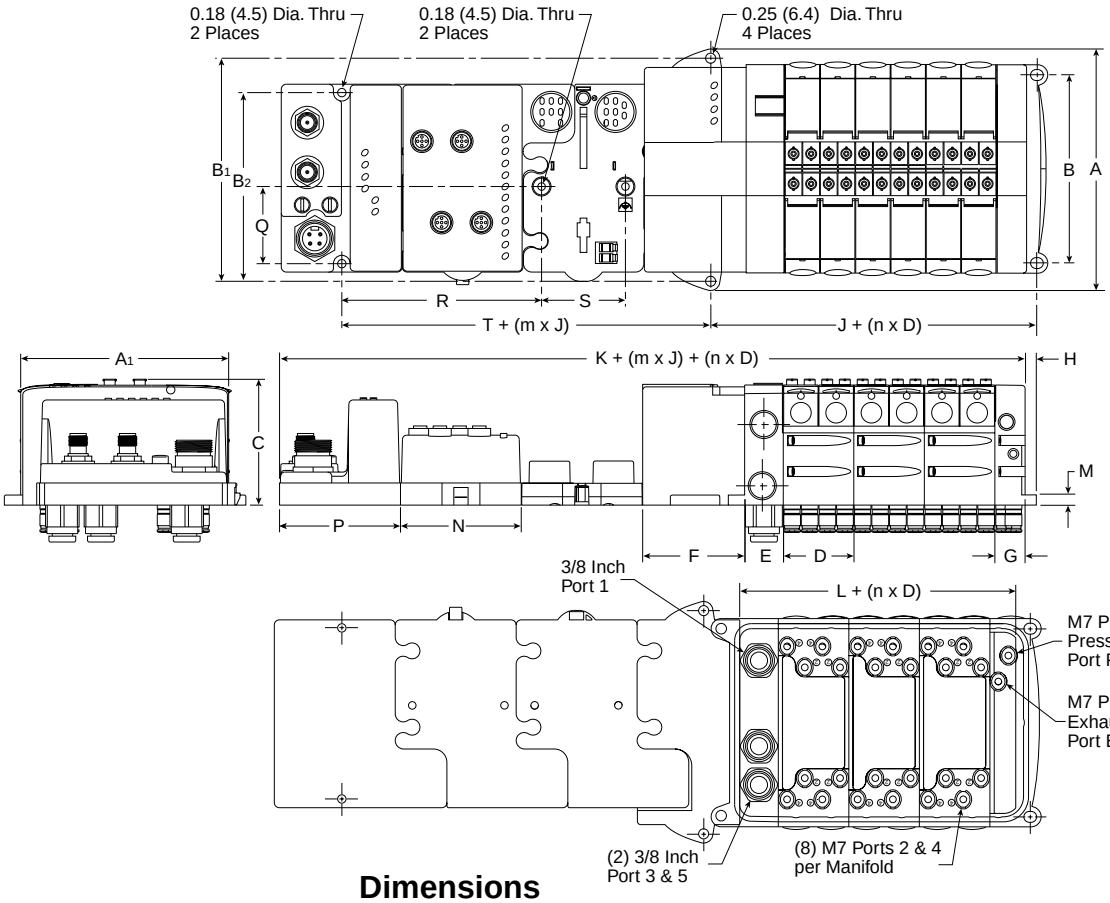


Dimensions

A	B	C	D
4.00 (102)	1.80 (46)	1.90 (48)	2.00 (50)
E	**F**	**G**	
.87 (22)	.43 (11)	4.41 (112)	

Inches (mm)

Bottom Ported Manifold



Dimensions

A	A1	B	B1	B2	C	D	E	F	G	H
5.67 (144.0)	4.88 (124.0)	4.41 (112.0)	5.24 (133.0)	4.02 (102.0)	2.95 (75.0)	1.65 (42.0)	0.91 (23.0)	2.40 (61.0)	0.71 (18.0)	0.49 (12.5)
J	**K**	**L**	**M**	**N**	**P**	**Q**	**R**	**S**	**T**	
2.72 (69.0)	7.32 (186.0)	1.69 (43.0)	0.24 (6.1)	2.83 (72.0)	2.83 (72.0)	1.81 (46.0)	4.72 (120.0)	2.01 (51.0)	2.01 (51.0)	

Inches (mm)
n = Number of Manifolds
m = Number of Modules

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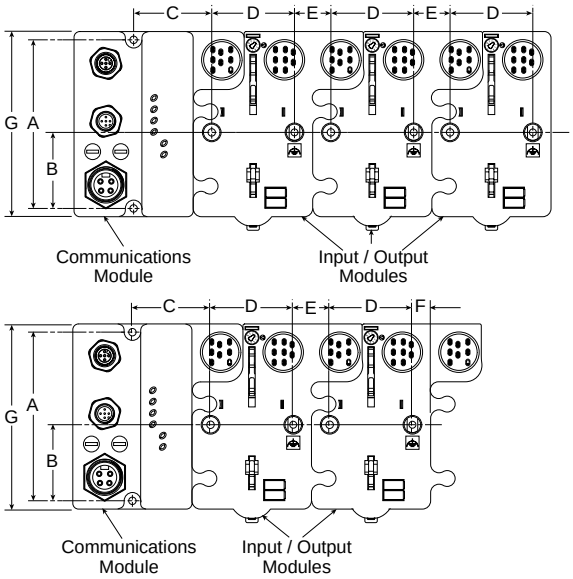
Isysnet with Isys Micro Valves

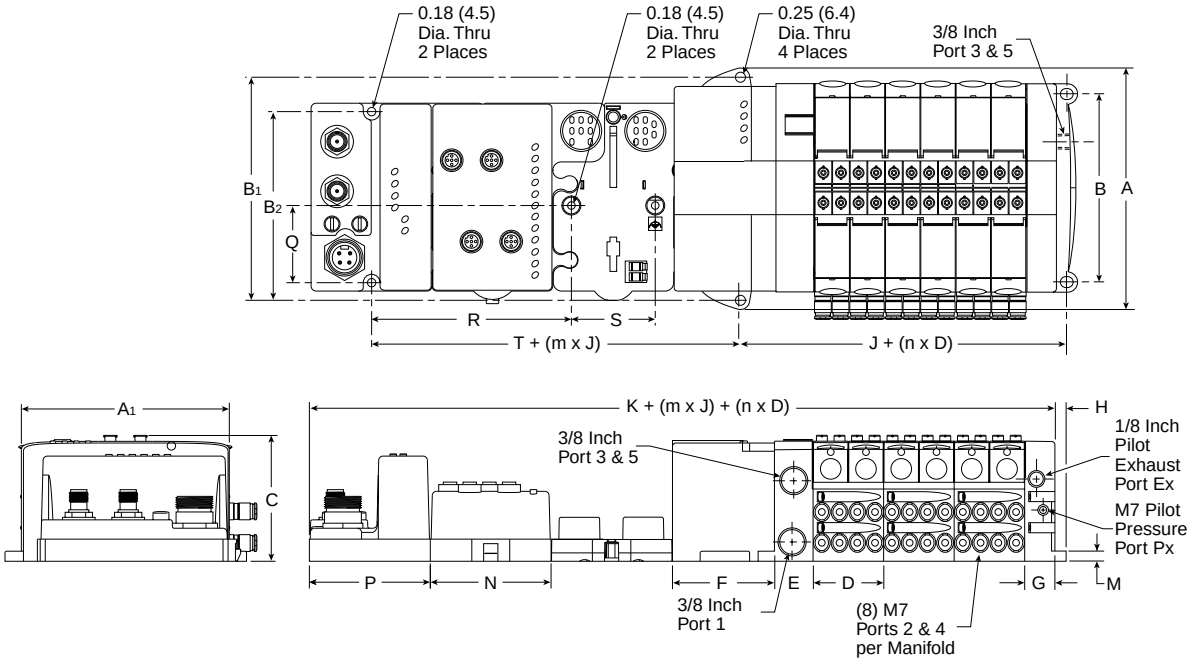


Dimensions

A	B	C	D
4.0 (102)	1.8 (46)	1.9 (48)	2.0 (50)
E	**F**	**G**	
.87 (22)	.43 (11)	4.41 (112)	

Inches (mm)

Side Ported Manifold



Dimensions

A	A1	B	B1	B2	C	D	E	F	G
5.67 (144.0)	4.88 (124.0)	4.41 (112.0)	5.24 (133.0)	4.02 (102.0)	2.95 (75.0)	1.65 (42.0)	0.91 (23.0)	2.40 (61.0)	0.71 (18.0)
H	**J**	**K**	**M**	**N**	**P**	**Q**	**R**	**S**	**T**
0.49 (12.5)	2.72 (69.0)	7.32 (186.0)	0.24 (6.1)	2.83 (72.0)	2.83 (72.0)	1.81 (46.0)	4.72 (120.0)	2.01 (51.0)	2.01 (51.0)

Inches (mm)
n = Number of Manifolds
m = Number of Modules

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Related Documentation

Additional user documentation presents information according to the tasks you perform and the programming environment you use. Refer to the table below for information on Isysnet products.

Isysnet Related Publications*

	Part Number	Description	Instruction Sheet*
General Information	—	Industrial Automation Wiring and Grounding Guidelines	E115P
		Safety Guidelines for the Application, Installation and Maintenance of Solid State Control	E116P
Pinout Wiring Diagram	PSSN8xxx, PSSP8xxx, PSST8xxx	Pinout Guide for Isysnet Digital I/O Modules	PSS-WD001
	PSSTR4M12A	Pinout Guide for Isysnet Relay Module	PSS-WD002
	PSSNACM12A, PSSNAVM12A, PSSTACM12A, PSSTAVM12A, PSSS23A	Pinout Guide for Isysnet Analog and Serial Modules	PSS-WD003
	PSSCDM12A, PSSCDM18PA, PSSCCNA, PSSCPBA, PSSCENA, PSSE24A	Pinout Guide for Isysnet Adapters and Power Supply	PSS-WD004
Communication Interfaces	PSSCDM12A	Isysnet DeviceNet Adapter Module, Drop or Pass-through, with male and female M12 connectors	E101P, Installation Instructions PSS-UM001, User Manual
	PSSCDM18PA	Isysnet DeviceNet Adapter Module, Drop or Pass-through, with male and female M18 connectors	
	PSSCCNA	Isysnet Redundant ControlNet Adapter Module	E103P, Installation Instructions PSS-UM003, User Manual
	PSSCENA	Isysnet Ethernet/IP 10/100 Mbps Adapter Module	E104P, Installation Instructions PSS-UM004, User Manual
	PSSCPBA	Isysnet PROFIBUS Adapter Module	E102P, Installation Instructions PSS-UM002, User Manual
Valve Driver Module	PSSV32A, PSSVM32A	32 Point Valve Driver Module	E100P
DC I/O	PSSN16M12A	24VDC 16 Sink Input w/8 M12 connectors, 2 points per connector	E106P
	PSSN8M8A	24VDC 8 Sink Input w/8 M8 connectors	
	PSSN8M12A	24VDC 8 Sink Input w/4 M12 connectors, 2 points per connector	
	PSSN8M23A	24VDC 8 Sink Input w/1 M23 connector	
	PSSP8M8A	24VDC 8 Source Input w/8 M8 connectors	
	PSSP8M12A	24VDC 8 Source Input w/4 M12 connectors, 2 points per connector	
	PSSP8M23A	24VDC 8 Source Input w/1 M23 connectors	
	PSST16M23A	24VDC 16 Source Output w/1 M23	E107P
	PSST16D25A	24VDC 16 Source Output w/1 25-Pin, D-Sub	
	PSST16M12A	24VDC 16 Source Output w/8 M12	
	PSST8M8A	24VDC 8 Source Output w/1 M23	
	PSST8M12A	24VDC 8 Source Output w/4 M12	
	PSST8M23A	24VDC 8 Source Output w/8 M8	
Analog	PSSNACM12A	24VDC Analog Current Input w/ 2 M12 connectors	E110P
	PSSNAVM12A	24VDC 2 Analog Voltage Input w/ 2 M12 connectors	
	PSSTACM12A	24VDC Analog Current Output w/ 2 M12 connectors	E111P
	PSSTAVM12A	24VDC Analog Voltage Output w/ 2 M12 connectors	
Power Unit	PSSSE24A	24VDC Expansion Power Supply	E105P
Relay Output	PSSTR4M12A	4 From A isolated (normally open) electromechanical relays	E109P

* Publications are electronic versions only. To make copies of these publications, go to: **http://www.parker.com/pneu/Isysnet**

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  - Problem and resolution description history
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Isysnet Technical Service calls should be directed to 1-269-629-5575

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Safety Guide For Selecting And Using Pneumatic Division Products And Related Accessories

⚠ WARNING:

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF PNEUMATIC DIVISION PRODUCTS, ASSEMBLIES OR RELATED ITEMS ("PRODUCTS") CAN CAUSE DEATH, PERSONAL INJURY, AND PROPERTY DAMAGE. POSSIBLE CONSEQUENCES OF FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THESE PRODUCTS INCLUDE BUT ARE NOT LIMITED TO:

- Unintended or mistimed cycling or motion of machine members or failure to cycle
- Work pieces or component parts being thrown off at high speeds.
- Failure of a device to function properly for example, failure to clamp or unclamp an associated item or device.
- Explosion
- Suddenly moving or falling objects.
- Release of toxic or otherwise injurious liquids or gasses.

Before selecting or using any of these Products, it is important that you read and follow the instructions below.

1. GENERAL INSTRUCTIONS

1.1. Scope: This safety guide is designed to cover general guidelines on the installation, use, and maintenance of Pneumatic Division Valves, FRLs (Filters, Pressure Regulators, and Lubricators), Vacuum products and related accessory components.

1.2. Fail-Safe: Valves, FRLs, Vacuum products and their related components can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of associated valves, FRLs or Vacuum products will not endanger persons or property.

1.3 Relevant International Standards: For a good guide to the application of a broad spectrum of pneumatic fluid power devices see: ISO 4414:1998, Pneumatic Fluid Power – General Rules Relating to Systems. See www.iso.org for ordering information.

1.4. Distribution: Provide a copy of this safety guide to each person that is responsible for selection, installation, or use of Valves, FRLs or Vacuum products. Do not select, or use Parker valves, FRLs or vacuum products without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the products considered or selected.

1.5. User Responsibility: Due to the wide variety of operating conditions and applications for valves, FRLs, and vacuum products Parker and its distributors do not represent or warrant that any particular valve, FRL or vacuum product is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the appropriate valve, FRL, Vacuum component, or accessory.
- Assuring that all user's performance, endurance, maintenance, safety, and warning requirements are met and that the application presents no health or safety hazards.
- Complying with all existing warning labels and / or providing all appropriate health and safety warnings on the equipment on which the valves, FRLs or Vacuum products are used; and,
- Assuring compliance with all applicable government and industry standards.

1.6. Safety Devices: Safety devices should not be removed, or defeated.

1.7. Warning Labels: Warning labels should not be removed, painted over or otherwise obscured.

1.8. Additional Questions: Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com, for telephone numbers of the appropriate technical service department.

2. PRODUCT SELECTION INSTRUCTIONS

2.1. Flow Rate: The flow rate requirements of a system are frequently the primary consideration when designing any pneumatic system. System components need to be able to provide adequate flow and pressure for the desired application.

2.2. Pressure Rating: Never exceed the rated pressure of a product. Consult product labeling, Pneumatic Division catalogs or the instruction sheets supplied for maximum pressure ratings.

2.3. Temperature Rating: Never exceed the temperature rating of a product. Excessive heat can shorten the life expectancy of a product and result in complete product failure.

2.4. Environment: Many environmental conditions can affect the integrity and suitability of a product for a given application. Pneumatic Division products are designed for use in general purpose industrial applications. If these products are to be used in unusual circumstances such as direct sunlight and/or corrosive or caustic environments, such use can shorten the useful life and lead to premature failure of a product.

2.5. Lubrication and Compressor Carryover: Some modern synthetic oils can and will attack nitrile seals. If there is any possibility of synthetic oils or greases migrating into the pneumatic components check for compatibility with the seal materials used. Consult the factory or product literature for materials of construction.

2.6. Polycarbonate Bowls and Sight Glasses: To avoid potential polycarbonate bowl failures:

- Do not locate polycarbonate bowls or sight glasses in areas where they could be subject to direct sunlight, impact blow, or temperatures outside of the rated range.
- Do not expose or clean polycarbonate bowls with detergents, chlorinated hydro-carbons, keytones, esters or certain alcohols.
- Do not use polycarbonate bowls or sight glasses in air systems where compressors are lubricated with fire resistant fluids such as phosphate ester and di-ester lubricants.

2.7. Chemical Compatibility: For more information on plastic component chemical compatibility see Pneumatic Division technical bulletins Tec-3, Tec-4, and Tec-5

2.8. Product Rupture: Product rupture can cause death, serious personal injury, and property damage.
- Do not connect pressure regulators or other Pneumatic Division products to bottled gas cylinders.
- Do not exceed the maximum primary pressure rating of any pressure regulator or any system component.
- Consult product labeling or product literature for pressure rating limitations.

3. PRODUCT ASSEMBLY AND INSTALLATION INSTRUCTIONS

3.1. Component Inspection: Prior to assembly or installation a careful examination of the valves, FRLs or vacuum products must be performed. All components must be checked for correct style, size, and catalog number. DO NOT use any component that displays any signs of nonconformance.

3.2. Installation Instructions: Parker published Installation Instructions must be followed for installation of Parker valves, FRLs and vacuum components. These instructions are provided with every Parker valve or FRL sold, or by calling 1-800-CPARKER, or at www.parker.com.

3.3. Air Supply: The air supply or control medium supplied to Valves, FRLs and Vacuum components must be moisture-free if ambient temperature can drop below freezing

4. VALVE AND FRL MAINTENANCE AND REPLACEMENT INSTRUCTIONS

4.1. Maintenance: Even with proper selection and installation, valve, FRL and vacuum products service life may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a component failure, and experience with any known failures in the application or in similar applications should determine the frequency of inspections and the servicing or replacement of Pneumatic Division products so that products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at minimum, must include instructions 4.2 through 4.10.

4.2. Installation and Service Instructions: Before attempting to service or replace any worn or damaged parts consult the appropriate Service Bulletin for the valve or FRL in question for the appropriate practices to service the unit in question. These Service and Installation Instructions are provided with every Parker valve and FRL sold, or are available by calling 1-800-CPARKER, or by accessing the Parker web site at www.parker.com.

4.3. Lockout / Tagout Procedures: Be sure to follow all required lockout and tagout procedures when servicing equipment. For more information see: OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – (Lockout / Tagout)

4.4. Visual Inspection: Any of the following conditions requires immediate system shut down and replacement of worn or damaged components:
- Air leakage: Look and listen to see if there are any signs of visual damage to any of the components in the system. Leakage is an indication of worn or damaged components.
- Damaged or degraded components: Look to see if there are any visible signs of wear or component degradation.
- Kinked, crushed, or damaged hoses. Kinked hoses can result in restricted air flow and lead to unpredictable system behavior.
- Any observed improper system or component function: Immediately shut down the system and correct malfunction.
- Excessive dirt build-up: Dirt and clutter can mask potentially hazardous situations.

Caution: Leak detection solutions should be rinsed off after use.

4.5. Routine Maintenance Issues:
- Remove excessive dirt, grime and clutter from work areas.
- Make sure all required guards and shields are in place.

4.6. Functional Test: Before initiating automatic operation, operate the system manually to make sure all required functions operate properly and safely.

4.7. Service or Replacement Intervals: It is the user's responsibility to establish appropriate service intervals. Valves, FRLs and vacuum products contain components that age, harden, wear, and otherwise deteriorate over time. Environmental conditions can significantly accelerate this process. Valves, FRLs and vacuum components need to be serviced or replaced on routine intervals. Service intervals need to be established based on:
- Previous performance experiences.
- Government and / or industrial standards.
- When failures could result in unacceptable down time, equipment damage or personal injury risk.

4.8. Servicing or Replacing of any Worn or Damaged Parts: To avoid unpredictable system behavior that can cause death, personal injury and property damage:
- Follow all government, state and local safety and servicing practices prior to service including but not limited to all OSHA Lockout Tagout procedures (OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – Lockout / Tagout).
- Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
- Disconnect air supply and depressurize all air lines connected to system and Pneumatic Division products before installation, service, or conversion.
- Installation, servicing, and / or conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversions air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or if the product does not operate properly, do not put product or system into use.
- Warnings and specifications on the product should not be covered or painted over. If masking is not possible, contact your local representative for replacement labels.

4.9. Putting Serviced System Back into Operation: Follow the guidelines above and all relevant Installation and Maintenance Instructions supplied with the valve FRL or vacuum component to insure proper function of the system.

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3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

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7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitations, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

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9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter "Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

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